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ABSTRACT

The Grammar, Spelling, and Punctuation (GSP) test is administered to students in the College of Communication at the University of Texas, Austin, as a means of determining eligibility to register for certain courses in journalism, broadcasting, and advertising. The test was administered in a paper-and-pencil version to 16 students and in a computerized (CAT) version of 23 students. Overall, results suggest that the CAT version is an excellent alternative to the paper-and-pencil test. The pass rate for both versions was 73%, and classification decisions of one version relative to the other had an overall agreement rate of 73%. Attitudes toward the clarity of directions, ease of use, and perception of skill assessment were overwhelmingly positive. An appendix lists equivalent scores on the two test versions. Six tables present study results. (SLD)

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2

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The Grammar, Spelling, and Punctuation (GSP) test is administered to students in the College of Communication as a means of determining eligibility to register for certain courses in Journalism, Radio-TV-Film, and Advertising. The 100-question examination is offered at the beginning of each semester and prior to pre-registration periods during the fall and spring semesters. Students are administered one of six forms of the multiple-choice test in typical paper-and-pencil format.

In the field of psychometrics an increasing amount of research is being conducted in the area of computerized adaptive testing (CAT). Computerized adaptive testing procedures involve the repeated estimation of an examinee's ability level based on his or her responses to items which have been presented and the adaptation of further item selection according to each item's degree of difficulty and the examinee's latest ability estimate. Advantages of computerized adaptive testing over paper-and-pencil versions include administration of only those items appropriate for an examinee's ability level, shorter test length (usually one-fourth to one-third shorter) with equal or greater precision of measurement, and immediate feedback provided to the examinee. The purpose of this study was to compare examinees' test performance on the paper-and-pencil and CAT versions of the GSP and gain insight into their attitudes towards the two formats of the test.

The GSP was administered in both paper-and-pencil format and computerized adaptive testing format on July 7, 1992. Volunteers to take the CAT version were solicited from the group of students who took the paper-and-pencil version of the GSP during the July testing period.

Method

Subjects

During the scheduled testing period, 39 students took the paper-and-pencil version of the GSP. Of those, 23 students (59%) volunteered to take theCAT version of the test, as indicated in Table 1. One examinee took both versions of the GSP, but due to a handicapping condition,

a nonstandard administration of the paper-and-pencil version was required. For this reason, data obtained from this student were deleted from the analyses.

Table 1

Numbers and Percentages of Students Who Took the Various Versions of the Grammar, Spelling, and Punctuation Tests Given on July 7, 1992 (N = 39)

Version	N	%
Paper-and-Pencil only	16	41.0%
Paper-and-Pencil plus Computerized	23	59.0%
Total	39	100.0%

Note. One student who took both versions of the Grammar, Spelling, and Punctuation Test was deleted from subsequent analyses due to a handicapping condition that required a nonstandard administration of the paper-and-pencil version.

Materials

The paper-and-pencil version of the GSP consists of 100 questions -- 33 questions each in the Grammar and Punctuation sections and 34 questions in the Spelling section. As stated previously, there are six forms of the test.

All three sections of the GSP are printed in one test booklet for the paper-and-pencil version, and the examinees may take the sections in any order or work between sections, if desired. Examinees are allowed up to 90 minutes to complete the test, though they may turn in their materials earlier if they finish before time is called.

The item bank for the CAT version was developed from the pool of items contained in the six forms of the paper-and-pencil version. The items span a wide range of difficulty levels.

Examinees may take the sections in any order on the CAT version; however, they cannot move between sections. Each section must be completed before moving on to the next one. Within each section, items are selected and presented in a tailored fashion based upon each examinee's performance on previously administered items. Specifically, the first item administered to each examinee is randomly selected from those items which have a difficulty

level in the middle range. If the examinee responds correctly to the first item, the next item presented will be more difficult than the first; however, if the examinee responds incorrectly, an easier item is presented next. This process of adapting the presentation of items to match the examinee's skill level based on responses to the previous items is continued until a sufficiently accurate estimate of the student's skill is obtained or a predetermined maximum number of items have been administered within a section. The result is that students are administered test items that are appropriate for their skill level; consequently, they are not administered items that are either too easy or too difficult for them. For this reason, students are not typically required to take as many test items with the computer adaptive version as they are with the paper-and-pencil version. For this study, the prespecified maximum number of items per section corresponded with the limits on the paper-and-pencil version: 33 items for the Grammar and Punctuation sections and 34 items for the Spelling section.

The two versions of the GSP also differ in terms of the scale on which scores are reported. The scores on the paper-and-pencil version are reported as a number correct score, while scores for the CAT version are reported as scaled scores that range from 20 to 80. For the paper-and-pencil version, a total score of 72 is considered to be passing. Based on the results of previous research, a composite score of 45 on the CAT version has been shown to be equivalent to a total score of 72 on the paper-and-pencil version of the GSP. The composite score on the CAT version is the average of the scaled scores from the Grammar, Spelling, and Punctuation sections.

Procedure

On July 7, 1992, the paper-and-pencil version of the GSP was administered to 39 students who were required to take the test prior to registering for certain College of Communication courses. Invitations to take the computerized adaptive version of the GSP were given to all examinees. Incentives used to solicit volunteers included no charge for the CAT administration and the use of the higher score between the CAT and the paper-and-pencil versions. The CAT version was administered at the Measurement and Evaluation Center to 23 students. All examinees were presented with instructions via computer and allowed time to become familiar with the keyboard and the appropriate method of responding to questions. As stated previously, examinees were able to select the order in which they took the three sections, but they were required to complete each section before moving on to the next one. It should be noted that no time limit was imposed on any section of the CAT version of the GSP. Results were presented to the student through the computer immediately after completion of the three sections.

After the students completed the computer adaptive version of the GSP test, they were asked to provide feedback about the test by responding to a set of five questions. These questions were also presented via the computer.

Results of the Test Administration

The average time spent on the CAT version, from presentation of the first screen of instructions to completion of the test, was 42.35 minutes. The average time spent on the examination itself was 37.18 minutes. For the Grammar section of the test, the average time examinees took was 16.39 minutes, while for Spelling the average was 5.96 minutes, and for Punctuation the average time was 14.83 minutes. These means are presented in Table 2, along with corresponding standard deviations, and minimum and maximum times spent on each section of the test and the sections combined.

Table 2
Descriptive Statistics for the Test Scores, Number of Items Administered, and Testing Times from the Computerized Version of the Grammar, Spelling, and Punctuation Test Given on July 7, 1992
(N = 22)

Scale	Mean	SD	Minimum	Maximum
Composite	49.73	5.96	39.00	59.00
NIA	60.86	10.16	53.00	100.00
TT	37.18	9.60	24.23	55.25
Grammar	48.91	6.90	34.00	62.00
NIA	19.96	3.71	17.00	33.00
TT	16.39	5.57	8.85	33.72
Spelling	49.04	7.19	34.00	64.00
NIA	20.41	3.70	18.00	34.00
TT	5.96	2.06	2.72	11.30
Punctuation	51.14	9.08	35.00	66.00
NIA	20.50	4.48	17.00	33.00
TT	14.83	5.08	9.45	32.13

Note. NIA is the number of items administered and TT is actual testing time.

The average number of items administered and the average scores per section and for the composite obtained from the CAT administration are also presented in Table 2, as are other descriptive statistics. The average number of items administered for the composite GSP was 60.86, while the averages for the three sections were 19.96 for Grammar, 20.41 for Spelling,

and 20.50 for Punctuation. On the paper-and-pencil version, all examinees are required to take 100 items.

The average composite score was 49.73, with a score of 45 considered to be passing. The average Grammar score was 48.91, while the average score for Spelling was 49.04 and for Punctuation it was 51.14.

In comparison to the paper-and-pencil version, the overall classification accuracy of pass/fail decisions based on the computerized version was 73%, as indicated in Table 3. Seventy-three percent of the examinees had a composite score of 45 or higher on the CAT version and 73% has a score of 72 or higher on the paper-and-pencil version; however, the students who passed one version were not necessarily the same students who passed the other version. Of the students who passed the paper-and-pencil version, 59% also passed the computerized version, while 14% who failed one version also failed the other version. Of those who passed the paper-and-pencil version, 14% failed the CAT version, while another 14% passed the CAT yet failed the paper-and-pencil version.

Table 3
Computerized Decision Relative to Paper-and-Pencil Decision for Students' Grammar, Spelling, and Punctuation Tests Given on July 7, 1992
(N = 22)

		Computerized		
		Pass	Fail	Total
Paper-and-Pencil	Pass	13 59%	3 14%	16 73%
	Fail	3 14%	3 14%	6 27%
	Total	16 73%	6 27%	22 100%

Note. Overall classification accuracy is 73%.

Table 4 presents descriptive statistics for those 16 examinees who took only the paper-and-pencil version. The average total score for those who passed (N = 10) was 78.70, while the average score for the 6 who did not pass the paper-and-pencil version was 59.17.

Table 4
Descriptive Statistics for the Paper-and-Pencil Total Test Scores Earned by Students Who Elected Not to Take the Computerized Version of the Grammar, Spelling, and Punctuation Test Given on July 7, 1992
(N = 16)

Pass-Fail Status	N	Mean	SD	Minimum	Maximum
Pass	10	78.70	5.08	73	90
Fail	6	59.17	3.89	53	64

A conversion table (see Appendix A) developed in a previous study was used to obtain CAT score equivalents for those 16 examinees who did not take the computerized version. When comparing the classification decisions of the computerized version relative to the paper-and-pencil version for the entire sample (N = 38; one examinee was deleted due to nonstandard administration), the overall classification accuracy rate is 84% (as shown in Table 5), which is comparable to a previous study.

Table 5
Computerized Decision Relative to Paper-and-Pencil Decision for Students' Grammar, Spelling, and Punctuation Tests
(N = 38)

		Computerized		
		Pass	Fail	Total
Paper-and-Pencil	Pass	23 61%	3 8%	26 68%
	Fail	3 8%	9 24%	12 32%
	Total	26 68%	12 32%	38 100%

Note. The 16 students who elected not to take the computerized version of the GSP Test were included in this table by using the conversion table developed in an earlier study. The overall classification accuracy is 84%.

Student Feedback

Students were presented five questions concerning their attitudes about the computerized version of the test after they completed the CAT version of the GSP. These questions and the distribution of responses are presented in Table 6. The vast majority of examinees felt that the directions were clear (95.4%) and that the method used to respond to the items was easy to use =(95.5%). Ninety-five and one-half percent (95.5%) of the examinees indicated that they liked getting their scores immediately after finishing the test (typically, examinees must wait until the next day to receive their paper-and-pencil scores), and 77% felt that the computerized version was able to assess their skills accurately. When asked which version of the GSP would be preferable, 50% indicated the computerized version, 36.4% indicated the paper-and-pencil version, while 13.6% had no preference.

Table 6

Response Numbers and Percentages for the Five Evaluative Items Pertaining to the Computerized Version of the Grammar, Spelling, and Punctuation Test Given on July 7, 1992 (N = 22)

The directions for the computerized version were clear.			
	Strongly Agree	14	(63.6%)
	Agree	7	(31.8%)
	Neutral	1	(4.5%)
	Disagree	0	(0.0%)
	Strongly Disagree	0	(0.0%)
The arrow keys used to enter my answers were easy to use.			
	Strongly Agree	17	(77.3%)
	Agree	4	(18.2%)
	Neutral	1	(4.5%)
	Disagree	0	(0.0%)
	Strongly Disagree	0	(0.0%)
I liked getting my scores immediately after the test was finished.			
	Strongly Agree	20	(90.9%)
	Agree	1	(4.5%)
	Neutral	0	(0.0%)
	Disagree	1	(4.5%)
	Strongly Disagree	0	(0.0%)

Table 6 (continued)

I think that the computerized version assessed my skills accurately.			
	Strongly Agree	9	(40.9%)
	Agree	8	(36.4%)
	Neutral	2	(9.1%)
	Disagree	3	(13.6%)
	Strongly Disagree	0	(0.0%)
Which version of the GSP would you prefer to take?			
	Computerized	11	(50.0%)
	Paper-and-Pencil	8	(36.4%)
	No preference	3	(13.6%)

Conclusion

Overall, the comparison of performance on both versions of the GSP and attitudes about the computerized adaptive version of the GSP relative to the paper-and-pencil version was very positive. The pass rate for both versions of the test was 73%, and the classification decisions of one version relative to the other had an overall rate of agreement of 73%. It should be noted that the overall classification accuracy rate of 84% (when the paper-and-pencil scores of the people who did not take the CAT were converted to the CAT scale and included) is identical to the accuracy rate achieved from a previous simulation study with the GSP which compared the CAT version to the full scale (362 item) version. The attitudes towards the clarity of directions, ease of use, and perception of skill assessment were overwhelmingly positive. In summary, it appears that the computerized adaptive testing version of the GSP provides an excellent alternative to the paper-and-pencil version.

The results of this study and another study conducted in 1992 were presented to the College of Communication. Based on these results, the Measurement and Evaluation Center was given approval to replace the paper-and-pencil administration of the GSP with the CAT version. The decision was made to limit the maximum number of items administered via CAT to 25 per section. More items did not provide additional information about a student's pass/fail status. Also, it was decided that examinees would be allowed to use scratch paper during the Spelling section due to the number of requests made by students during the July 7, 1992, test session. The administration of the CAT version of the GSP was implemented during September 1992.

APPENDIX A

Equivalent Scores on the Computerized and Paper-and-Pencil Versions of the GSP Test

APPENDIX A

Equivalent Scores on the Computerized and Paper-and-Pencil Versions of the GSP Test

Computerized	Paper-and-Pencil
20	32
21	33
22	35
23	36
24	38
25	40
26	41
27	42
28	44
29	46
30	48
31	49
32	50
33	53
34	55
35	57
36	58
37	59
38	61
39	63
40	64
41	65
42	67
43	68
44	70
45	72
46	73
47	74
48	76
49	77
50	78
51	80
52	80
53	82
54	83
55	84
56	84
57	85
58	86

(continued next page)

Appendix A (continued)

Computerized	Paper-and-Pencil
59	87
60	88
61	89
62	90
63	90
64	91
65	92
66	92
67	93
68	93
69	94
70	94
71	94
72	95
73	95
74	96
75	96
76	96
77	97
80	97